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Safety and cost effectiveness of immediate sequential bilateral cataracts surgery

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ABSTRACT A clinical decision report using:

Rush SW, Gerald AE, Smith JC, Rush AJ, Rush RB. Prospective analysis of outcomes and economic factors of same-day bilateral cataract surgery in the United States. *Journal of Cataract and Refractive Surgery*. 2015;41(4):732-739.
<https://doi.org/10.1016/j.jcrs.2014.07.034>

for a patient with bilateral cataracts.

Keywords: ophthalmology, cataract surgery, cataracts, surgery

Clinical-Social Context

Regina Smith [pseudonym] is a 77-year-old woman with a chief complaint of poor vision. She resides in Jamaica, and she is accompanied by her son whom she is visiting. Two years ago, she was told by an optometrist in Jamaica that she had cataracts in both eyes, which is confirmed upon ophthalmologic examination. She has no other history of any eye disease. Her vision has progressively worsened to the point it interferes with tasks of daily living including walking and driving. She is retired and says she must be frugal. Her only insurance is Medicare, which does not cover procedures done in Jamaica. Her highest level of education is high school. She has hypertension and high cholesterol, both of which are managed well by medication. When getting estimates for cataract surgery from within and out of Jamaica, she found the most affordable option was to fly to Michigan to receive cataract surgery while staying at her son's home. Mrs. Smith had travelled a long way for this surgery, and she worried that she would be a burden on her son while she recovered. Therefore, Mrs. Smith's only requests were to have a quick recovery and for the procedure to be within her estimated budget. To honor her requests, we discussed the option of immediate sequential bilateral cataract surgery (ISBCS), rather than the delayed sequential (DSBCS) approach.

Clinical Question

Does ISBCS pose higher risks to patient health and more financial burden than DSBCS?

Research Article

Rush SW, Gerald AE, Smith JC, Rush AJ, Rush RB. Prospective analysis of outcomes and economic factors of same-day bilateral cataract surgery in the United States. *Journal of Cataract and Refractive Surgery*. 2015;41(4):732-739.
<https://doi.org/10.1016/j.jcrs.2014.07.034>¹

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Description of Related Literature

Using the PubMed “advanced search” option, the terms “(Bilateral Cataract Surgery)” were searched with the filters “Clinical Trial” and “Randomized Control Trial” and “English” which yielded 385 results. A manual review of article titles showed that only 8 of these were trials comparing immediate and delayed approaches.

Of these 8 articles, several articulated the risks and outcomes of ISBCS vs DSBCS. Chung et al. conducted a clinical trial which compared ISBCS and DSBCS by measuring visual acuity, degree of anisometropia, and complication rates. With a sample size of 194 patients, the group concluded that bilateral cataract surgery may be an effective and safe option with a high degree of patient satisfaction.² Serrano-Aguilar et al. conducted a multicenter randomized clinical trial based in Spain with an impressive sample size of 1614 patients that found no difference in intraoperative and postoperative surgical complications, visual acuity, or self-perceived visual function between ISBCS and DSBCS after 1 year follow up.³ Lundström et al. performed a randomized clinical trial that assigned 96 patients to either DSBCS or ISBCS and compared each group’s self-assessed visual function at 2 and 4-month follow-up. It was found that ISBCS restored self-assessed visual function faster than DSBCS on 2-month follow-up, however, both groups ultimately showed similar self-assessment upon final 4-month follow-up.⁴ Nassiri et al. performed a similar clinical trial, but gave 220 patients the choice of ISBCS or DSBCS. After a 4 month follow-up, it was found that there was no difference in visual function via objective examination as well as self-assessment.⁵ Finally, Sariikkola et al. conducted a clinical trial with 504 patients which found “refractive outcomes, rates and complications, and patient-rated satisfaction were similar whether ISBCS or DSBCS”.⁶ This group also found that spherical error of intraocular lenses (IOL) was similar between ISBCS and DSBCS.⁶ This means that the long-held thought that DSBCS was superior to ISBCS because the surgeon was able to adjust IOL power between eyes is not necessarily true.

Altogether, these 5 articles paint a favorable clinical picture for ISBCS. They dismiss the widely held belief that ISBCS is more likely to cause complications (endophthalmitis, corneal edema, crystalline macular edema, and retinal detachment) and IOL inaccuracies. These studies attest that ISBCS is as safe and slightly more efficacious than DSBCS. However, none explore the potential cost of the procedure on both the patient and healthcare institution. Leivo et al. conducted an economic and clinical analysis of its sister trial (Sariikkola et al., N=491). Their clinical analysis found that when measuring perioperative and postoperative complications, change in corrected distance visual acuity, visual function index-7 (self assessment), refraction, and patient-rated satisfaction found there was no statistically significant outcome between ISBCS and DSBCS.⁷ Economic analysis measured health-care costs (cost of surgery, pre and post-operative visits), non-health-care costs (cost of travel, home care and patient aid), and time costs. This analysis found ISBCS saved 443 euros in health-care costs, 20% savings in operating room floor and wage costs, 300 euros in non-health-care costs, and almost 900 euros in time cost (if the patient was working).⁷ Although this study paints ISBCS favorably both clinically and economically, it does not place in the United States Healthcare system nor consider non-working people traveling from outside a country in its economic analysis.

For this reason, Rush et al. was chosen for Mrs. Smith’s healthcare decision as this is a prospective controlled nonrandomized clinical trial that takes place in the United States and analyzes not only health outcomes of ISBCS but also economic factors. The study found that ISBCS is as safe and more cost effective for the patient than DSBCS.¹

The body of literature presented may be considered to have a Grade A Strength of Recommendation based on the SORT criteria.⁸

Critical Appraisal

Rush et al. is a prospective controlled nonrandomized clinical trial of 84 patients who chose to undergo either ISBCS or DSBCS (42 ISBCS, 42 DSBCS). Patients 30-100 years old were recruited from a private practice in Amarillo, Texas. The trial excluded patients who were not candidates of standard of care phacoemulsification under topical anesthesia, were known to have an allergic reaction to pharmaceuticals used in the study, or had history of severe eye disease (uveitis, advanced or poorly controlled glaucoma, corneal disease, corneal transplantation, etc.). ISBCS and DSBCS candidates were age matched within 3 years and had their first surgery within 2 weeks of each other by the same surgeon. DSBCS candidates had their second surgery 1-3 weeks after the first by the same surgeon. ISBCS and DSBCS surgeries were done in the same manner, except ISBCS surgery followed the standard of care “separate everything” technique with re-drape and re-gowning midway through the procedure. Postoperatively patients were given clear plastic protective shields that were taped over the operated eye and given prophylactic antibiotics and prednisolone eye drops to be



used 4 times a day for 7 days. Each eye operated on required 3 follow-up appointments. The first occurred within 24 hours from the time of surgery, a second evaluation at 21 days, and a third at 90 days.

Data collection involved: obtaining a preoperative baseline or characteristics and demographic features (age, sex, visual acuity measures, distance traveled), intraoperative details (occurrence of surgical complications or breach in sterile environments), postoperative outcomes (error in refractive outcomes, endophthalmitis, increased intraocular pressure, other complications), economic factors of the patient (total number of visits required for care and total distance traveled), economic factors of the physician (total reimbursement for surgery and postoperative time spent on each eye), economic factors for the surgical center (total facility fee reimbursement), and economic factors for the third-party payer. Statistical analysis involved one-way analysis of variance to perform comparative analysis of numerical outcome variables, whereas contingency analysis with likelihood ratios was used for the nominal outcome variables.

Results indicate that ISBCS is as safe and more efficacious than DSBCS. Clinical analysis showed no complications occurred intra- nor post-operatively in either group. Anisometropia occurred in 12 of the 42 DSBCS while no ISBCS patients experienced anisometropia. Refractive error was .14 in ISBCS and .16 DSBCS ($p=.7247$), showing no significant difference. Recovery time was 3.3 weeks in ISBCS and 5.9 in DSBCS ($p<.0001$). Economic analysis showed total distance traveled for care for out-of-town residents was 522 miles in ISBCS and 969.3 miles in DSBCS ($p<.0001$). Total physician reimbursement, however, was \$1340 in ISBCS while \$1705 in DSBCS ($p<.0001$). From the perspective of the surgical center, there were no significant time or cost-saving benefits between ISBCS and DSBCS. As a well-designed nonrandomized control trial, this study is level 3 evidence based on the SORT criteria.⁸ This study is likely to be very reproducible because many countries outside of the US utilize ISBCS with great success.¹ There were no biases found to report. In summary, ISBCS is a beneficial procedure for patients like Mrs. Smith who require a fast recovery and minimal travel (due to disability in this case) and is sustainable for the surgical center.

Clinical Application

Regina Smith [pseudonym] is a 77-year-old woman who is presenting with disabling cataracts. She is staying in Michigan with her son because the total costs of surgery is more cost effective in Michigan than in Jamaica. To not burden her son, she wants her recovery to be as fast as possible with minimal follow-ups. Using the evidence presented in this paper, ISBCS is as safe and more cost effective than DSBCS. When this information was presented to Mrs. Smith by her medical team, she elected to undergo ISBCS. She was able to afford the procedure and convalesce for the minimum amount of time before returning to her normal daily activities with her vision restored.

New Knowledge Related to Clinical Decision Science

Medical tourism can appear in a variety of ways. Most commonly, patients from a wealthy country travel to a country where they receive services or elective care at a substantially lower cost. Additionally, patients may travel from a location where services are not readily available, whether that be from government regulation or increased demand. In this case, the patient traveled for their procedure so that they had familial support for their recovery. The patient was also able to utilize their Medicare health coverage which made the procedure affordable.

This case demonstrates the cost and time effectiveness offered by ISBCS for an out-of-country resident. It gives us insight into not only the safety of ISBCS, but also the economic implications for patients, healthcare institutions, and physicians themselves. It is with hope that ISBCS becomes standard of care and that reimbursement will be adjusted to incentivize physicians to perform this resource saving and sustainable procedure that is more accessible to those with disabilities and barriers of transportation.

This Clinical Decision Report raises the question of why ISBCS is not offered to residents of the United States more often. Surely, they have similar needs for cost-effective, non-disruptive care. A careful analysis and healthcare delivery analysis is called for.

Conflict Of Interest Statement

The authors declare no conflicts of interest.



References

1. Rush SW, Gerald AE, Smith JC, Rush AJ, Rush RB. Prospective analysis of outcomes and economic factors of same-day bilateral cataract surgery in the United States. *Journal of Cataract and Refractive Surgery*. 2015;41(4):732-739. <https://doi.org/10.1016/j.jcrs.2014.07.034>
2. Chung JK, Park SH, Lee WJ, Lee SJ. Bilateral cataract surgery: A controlled clinical trial. *Japanese Journal of Ophthalmology*. 2009;53(2):107-113. <https://doi.org/10.1007/s10384-008-0627-6>
3. Serrano-Aguilar P, Ramallo-Fariña Y, Cabrera-Hernández JM, et al. Immediately sequential versus delayed sequential bilateral cataract surgery: Safety and Effectiveness. *Journal of Cataract and Refractive Surgery*. 2012;38(10):1734-1742. <https://doi.org/10.1016/j.jcrs.2012.05.024>
4. Lundström M, Albrecht S, Nilsson M, Åström B. Benefit to patients of bilateral same-day cataract extraction: Randomized Clinical Study. *Journal of Cataract and Refractive Surgery*. 2006;32(5):826-830. <https://doi.org/10.1016/j.jcrs.2006.01.075>
5. Nassiri N, Nassiri N, Sadeghi Yarandi SH, Rahnavardi M. Immediate vs delayed Sequential Cataract surgery: A comparative study. *Eye*. 2007;23(1):89-95. <https://doi.org/10.1038/sj.eye.6702989>
6. Sarikkola A-U, Uusitalo RJ, Hellstedt T, Ess S-L, Leivo T, Kivelä T. Simultaneous bilateral versus Sequential Bilateral Cataract surgery: Helsinki Simultaneous Bilateral Cataract Surgery Study Report 1. *Journal of Cataract and Refractive Surgery*. 2011;37(6):992-1002. <https://doi.org/10.1016/j.jcrs.2011.01.019>
7. Leivo T, Sarikkola A-U, Uusitalo RJ, Hellstedt T, Ess S-L, Kivelä T. Simultaneous bilateral cataract surgery: Economic analysis; Helsinki Simultaneous Bilateral Cataract Surgery Study Report 2. *Journal of Cataract and Refractive Surgery*. 2011;37(6):1003-1008. <https://doi.org/10.1016/j.jcrs.2010.12.050>
8. Ebell MH, Siwek J, Weiss BD, et al. Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *J Am Board Fam Pract*. 2004;17(1):59-57. <https://doi.org/10.3122/jabfm.17.1.59>

